Machine Vision Automation for Ground Control Tele-Robotics

Completed Technology Project (2012 - 2013)

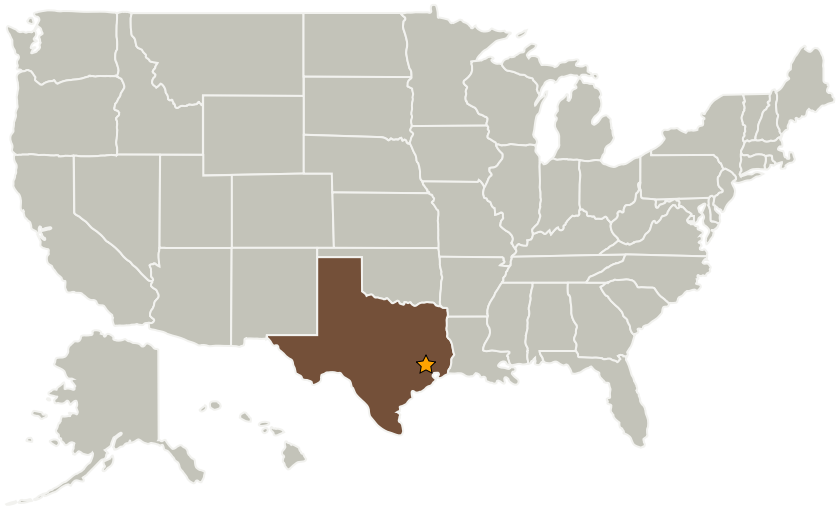
Project Introduction

This project seeks to advance ground based tele-robotic capabilities with the development of natural feature target tracking technology with the use of machine vision. The machine vision technology will be applied to Mobile Servicing System (MSS) Ground Control on the ISS as a proof of concept for increasing efficiency and safety of operations. The current MSS Ground Control systems rely on operator interpretation of visual cues which are sometimes nothing more than comparing the payload with surrounding structure. This technology has the potential to automate much of this operator interpretation providing safer and more efficient Ground Control operations. This project is led by JSC civil servants and scope to one year in length.

Anticipated Benefits

Proof-of-concept: Demonstrate the value of providing machine vision generated solutions versus operator derived solutions with respect to interpreting grapple, grasp, and ORU installation cues.
Validate the reduction in workload for mission planning, procedure validation, and task execution
Demonstrate that a potential error source is eliminated (human error interpreting visual cues)
This project will develop and deliver an operationally useful product without the need for follow-on funding to realize the benefits advertised (future/follow-on funding allows for further expansion of the efficiency gains in other ISS systems).
Utilize the IDC for the development of a camera/target test bed.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Center Innovation Fund: JSC CIF

Center Innovation Fund: JSC CIF

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Jacobs Engineering Group, Inc.	Supporting Organization	Industry	Dallas, Texas

Primary U.S. Work Locations
Texas

Project Management

Program Director:
Michael R Lapointe

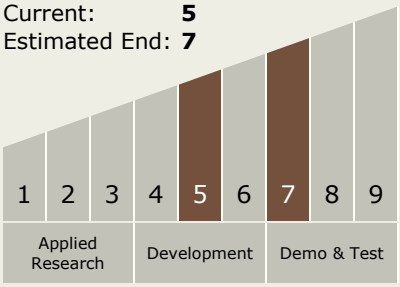
Program Manager:
Carlos H Westhelle

Project Manager:
Ian J Mills

Principal Investigator:
Ian J Mills

Technology Maturity (TRL)

Start: **5**
Current: **5**
Estimated End: **7**



Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.2 Reasoning and Acting
    - TX10.2.4 Execution and Control